IN THE CLAIMS

Set out immediately below is a set of all pending claims with markings to show any amendments submitted herein. Please enter the claims, as amended.

1. (currently amended) A computer implemented method in a simulation of a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations and is simulated by a second system described by a second set of simultaneous linear algebraic equations, the method being for ~~of~~ determining an~~the~~ equivalence of the~~a~~ first and a second sets of simultaneous linear algebraic equations, each of said equations being of a form:

$$e_{i1}x_1 + e_{i2}x_2 + e_{i3}x_3 + \ldots + e_{in}x_n = b_i$$

wherein x_j are unknowns, e_{ij} are coefficients, and b_i are quantities, said coefficients and quantities being known algebraic expressions, said method comprising the steps of:

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iteratively eliminating said unknowns from each of said sets of simultaneous linear algebraic equations until each of said equations are in a ~~the~~ form:

$$(l_{ii})_k\, x_i = (r_i)_k$$

wherein l_{ii} and r_i are algebraic expressions, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from; and

comparing, for each of said unknowns, ~~the~~ a product~~s~~ $(l_{ii})_1 * (r_i)_2$ and a product $(l_{ii})_2 * (r_i)_1$, wherein said first and said second set of simultaneous linear algebraic equations are equivalent if said products match for all said unknowns.

2. (Previously presented) The computer implemented method according to claim 1, said method further including the initial steps of:

recasting said algebraic expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand; and

reducing said strings in accordance with a set of predetermined simplifying rules to obtain reduced expressions; and

wherein said eliminating step is performed on said reduced strings in accordance with a set of predetermined operations.

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3. (Previously presented) The method according to claim 2, wherein said simplifying rules comprise performing the steps of:

arranging the token pairs into subgroups;

arranging the operand tokens in such a ~~an arranged~~ subgroup in a certain order, thereby producing ordered operands;

reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and

consolidating one or more multiple instances of similar subgroups, to produce a reduced string.

4. (currently amended) A computational apparatus for use in simulating a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations and is simulated by a second system described by a second set of simultaneous linear algebraic equations, wherein the apparatus is for determining an~~the~~ equivalence of the~~a~~ first and ~~a~~ second sets of simultaneous linear algebraic equations, each of said equations being in the form:

$$e_{i1}x_1 + e_{i2}x_2 + e_{i3}x_3 + \ldots + e_{in}x_n = b_i$$

wherein x_j are unknowns, e_{ij} are coefficients, and b_i are quantities, said coefficients and quantities being known algebraic expressions, said apparatus comprising:

means for iteratively eliminating said unknowns from each of said sets of simultaneous linear algebraic equations until each of said equations are in a~~the~~ form:

$$(l_{ii})_k\, x_i = (r_i)_k$$

wherein l_{ii} and r_i are algebraic expressions, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from; and

means for comparing, for each of said unknowns, a~~the~~ product~~s~~ $(l_{ii})_1{*}(r_i)_2$ and a product $(l_{ii})_2{*}(r_i)_1$, wherein said first and said second set of simultaneous linear algebraic equations are equivalent if said products match for all said unknowns.

5. (Previously presented) The computational apparatus according to claim 4, said apparatus further including:

means for recasting said algebraic expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand; and

means for reducing said strings in accordance with a set of predetermined simplifying rules to obtain reduced expressions; and

wherein said means for eliminating operates on said reduced strings in accordance with a set of predetermined operations.

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6. (Previously presented) The apparatus according to claim 5, wherein said eliminating means performs the predetermined operations of:

arranging the token pairs into subgroups;

arranging the operand tokens in such a ~~an arranged~~ subgroup in a certain order, thereby producing ordered operands;

reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and

consolidating one or more multiple instances of similar subgroups, to produce a reduced string.

7. (currently amended) A computer program product carried by a storage medium, the computer program product being for use in a simulation of a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations and is simulated by a second system described by a second set of simultaneous linear algebraic equations, wherein the computer program product is for determining an~~the~~ equivalence of the~~a~~ first and ~~a~~ second sets of simultaneous linear algebraic equations, each of said equations being of a form:

$$e_{i1}x_1 + e_{i2}x_2 + e_{i3}x_3 + \ldots + e_{in}x_n = b_i$$

wherein x_j are unknowns, e_{ij} are coefficients, and b_i are quantities, said coefficients and quantities being known algebraic expressions, said computer program product comprising:

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a program element for iteratively eliminating said unknowns from each of said sets of simultaneous linear algebraic equations until each of said equations are in a~~the~~ form:

$$(l_{ii})_k\, x_i = (r_i)_k$$

wherein l_{ii} and r_i are algebraic expressions, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from; and

a program element for comparing, for each of said unknowns, a~~the~~ products $(l_{ii})_1 * (r_i)_2$ and a product $(l_{ii})_2 * (r_i)_1$, wherein said first and said second set of simultaneous linear algebraic equations are equivalent if said products match for all said unknowns.

8. (Previously presented) The computer program of claim 7 further comprising:

a program element for recasting said algebraic expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand; and

a program element for reducing said strings in accordance with a set of predetermined simplifying rules to obtain reduced expressions; and

wherein said program element for eliminating operates on said reduced strings in accordance with a set of predetermined operations.

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9. (Previously presented) The computer program of claim 8 wherein said program element for eliminating performs the predetermined operations of:

arranging the token pairs into subgroups;

arranging the operand tokens in such a ~~an arranged~~ subgroup in a certain order, thereby producing ordered operands;

reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and

consolidating one or more multiple instances of similar subgroups, to produce a reduced string.

10. (currently amended) A computer implemented method in a simulation of a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations (SLAEs) and is simulated by a second system described by a second set of SLAEs, the method being for determining anthe equivalence of the first and second sets of ~~simultaneous linear algebraic equations~~ ~~(~~SLAEs~~)~~, each said set comprising two or more algebraic equations, said method comprising the steps of:

reducing each SLAE to a standard form; and

comparing the SLAEs to determine whether equivalence exists.

11. (Previously presented) The method of claim 10, wherein said reducing step includes the steps of:

converting each SLAE into a reduced form;

performing an elimination process; and

performing a back substitution process generating a two part string array form for each SLAE.

12. (Previously presented) The method of claim 10, wherein said comparing step includes the steps of:

forming a product of a part of a string array with a part of another said string array;

forming a product of the other part of a string array with the other part of said another string array; and

comparing said respective products for mathematical equivalence.

13. (Previously presented) The method of claim 12, wherein, for a~~the~~ case of three or more sets, said comparing step is repeated for combinations of pairs of the ~~total number of~~ sets.

14. (currently amended) A computer implemented method in a simulation of a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations (SLAEs) and is simulated by a second system described by a second set of SLAEs, the method being for ~~of~~ determining an~~the~~ equivalence of the~~a~~ first and a second sets of ~~simultaneous linear algebraic equations (~~SLAEs~~)~~, said method comprising the steps of:

iteratively eliminating unknowns from each of said sets of SLAEs to place each SLAE in a two-part standard form; and

forming a product of a part of one said standard form equation with a part of another part of another said standard form equation;

forming a product of the other part of said standard form equation with the other part of said another standard form equation; and

comparing said respective products for mathematical equivalence.